AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions, and listings, of claims in the application.

1. (Currently Amended) A transverse induction heating apparatus comprising:

inductors including iron cores and coils wound around the iron cores, disposed between a rough rolling mill and a finish rolling mill of a steel hot-rolling line, opposite to each other ~~across~~ on opposite sides of a material to be rolled and conveyed by a conveying roll, the material being heated by the inductors to which electric power is supplied from an AC power source, wherein,

iron core widths of the inductors in a plate width direction of the material to be rolled are smaller than the plate width of the material to be rolled,

the inductors are disposed on a plate width center line of the material to be rolled, and,

when current penetration depth is δ (m), specific resistance of the material to be rolled is ρ (Ω-m), magnetic permeability of the material to be rolled is μ (H/m), ~~heating~~ frequency of the AC power source is f (Hz), and plate thickness of the material to be rolled is tw (m),

$$\delta = \sqrt{\frac{\rho}{\mu \cdot f \cdot \pi}} \text{ and } \frac{tw}{\delta} < 0.95 .$$

2. (Previously Presented) The transverse induction heating apparatus according to claim 1, wherein the inductors include plural magnetic poles.

3. (Previously Presented) The transverse induction heating apparatus according to claim 1, wherein respective coils are connected in series to each other.

4. (Currently Amended) The transverse induction heating apparatus according to claim 1, ~~wherein~~ including lifting and lowering means for adjusting respective inductors ~~can be moved~~ in a plate thickness direction of the material to be rolled ~~by lifting and lowering means~~.

5. (Previously Presented) The transverse induction heating apparatus according to claim 1, including at least two pairs of the inductors disposed in a traveling direction of the material to be rolled, wherein the conveying roll is disposed between the inductors.

6. (Previously Presented) The transverse induction heating apparatus according to claim 5, wherein the iron core of each of the inductors is disposed on the plate width center line of the material to be rolled.

7. (Previously Presented) The transverse induction heating apparatus according to claim 5, wherein a surface of the conveying roll is coated with an electrically insulating member.

8. (Currently Amended) ~~A~~ The transverse induction heating apparatus according to claim 1, wherein the at least two pairs of the inductors are disposed from an upstream side to a downstream side of the steel hot-rolling line, ~~the~~ and including a plurality of AC power sources ~~are~~ individually connected to respective inductors, ~~and, when heating~~ wherein frequencies of the AC power sources are F1, F2, $\cdots$ Fn from an upstream side of the steel hot-rolling line, ~~and~~ K = 1.05 to 1.20, and the ~~heating~~ frequencies of the respective AC power sources satisfy

$$F1 > F2 \times K > \cdots > Fn \times K^{n-1}.$$

9. (Previously Presented) The transverse induction heating apparatus according to claim 2, wherein respective coils are connected in series to each other.

10. (Currently Amended) The transverse induction heating apparatus according to claim 2, ~~wherein~~ including lifting and lowering means for adjusting respective inductors ~~can be moved~~ in a plate thickness direction of the material to be rolled ~~by lifting and lowering means~~.

11. (Currently Amended) The transverse induction heating apparatus according to claim 3, ~~wherein~~ including lifting and lowering means for adjusting respective inductors ~~can be moved~~ in a plate thickness direction of the material to be rolled ~~by lifting and lowering means~~.

12. (Previously Presented) The transverse induction heating apparatus according to claim 2, including at least two pairs of the inductors disposed in a traveling direction of the material to be rolled, wherein the conveying roll is disposed between the inductors.

Claims 13-16 (Cancelled).

17. (Previously Presented) The transverse induction heating apparatus according to claim 12, wherein the iron core of each of the inductors is disposed on the plate width center line of the material to be rolled.

18. (Previously Presented) The transverse induction heating apparatus according to claim 12, wherein a surface of the conveying roll is coated with an electrically insulating member.

Claims 19-20 (Cancelled).

21. (New) The transverse induction heating apparatus according to claim 17, wherein the at least two pairs of the inductors are disposed from an upstream side to a downstream side of the steel hot-rolling line, and including a plurality of AC power sources individually connected to respective inductors, wherein frequencies of the AC power sources are F1, F2, $\cdots$ Fn from an upstream side of the steel hot-rolling line, K = 1.05 to 1.20, and the frequencies of the respective AC power sources satisfy

$$F1 > F2 \times K > \cdots > Fn \times K^{n-1}.$$